

What is claimed is:

1. A substrate treating method for performing a series of substrate treating processes to form a pattern on a substrate  
5 by forming a coating film of a chemically amplified photore-  
sist on the substrate, exposing the substrate having the  
coating film formed thereon, and developing the exposed  
substrate, said method comprising the steps of:  
controlling a substrate treating condition relating to  
10 acid diffusion that influences spread of an acid produced in  
said coating film by exposure of said coating film, according  
to a pivotal shift which is a difference between an actual  
pattern size and a mask pattern size, said actual pattern  
size being obtained from a processing carried out at a pivotal  
15 point which is an exposing condition resulting in little varia-  
tion in pattern size even with variations in focus of exposing  
light; and  
performing said series of substrate treating processes  
based on said substrate treating condition relating to acid  
20 diffusion as controlled.
2. A substrate treating method as defined in claim 1,  
wherein said substrate treating condition relating to acid  
diffusion is a substrate treating condition relating to  
25 pre-exposure heating that influences heating of the coating

film before said exposure.

3. A substrate treating method as defined in claim 1,  
wherein said substrate treating condition relating to acid  
5 diffusion is a substrate treating condition relating to  
post-exposure heating that influences heating of the coating  
film after said exposure.

4. A substrate treating method as defined in claim 2,  
10 wherein said substrate treating condition relating to  
pre-exposure heating is a heating time of the coating film  
before said exposure, said series of substrate treating proc-  
esses being performed based on said heating time as con-  
trolled.

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5. A substrate treating method as defined in claim 2,  
wherein said substrate treating condition relating to  
pre-exposure heating is a heating temperature of the coating  
film before said exposure, said series of substrate treating  
20 processes being performed based on said heating tempera-  
ture as controlled.

6. A substrate treating method as defined in claim 3,  
wherein said substrate treating condition relating to  
25 post-exposure heating is a heating time of the coating film

after said exposure, said series of substrate treating processes being performed based on said heating time as controlled.

5    7. A substrate treating method as defined in claim 3,  
wherein said substrate treating condition relating to  
post-exposure heating is a heating temperature of the  
coating film after said exposure, said series of substrate  
treating processes being performed based on said heating  
10    temperature as controlled.

8. A substrate treating method as defined in claim 1,  
wherein said substrate treating condition relating to acid  
diffusion is controlled to reduce said pivotal shift to zero.

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9. A substrate treating method for performing a series of  
substrate treating processes to form a pattern on a substrate  
by forming a coating film of a chemically amplified photore-  
sist on the substrate, exposing the substrate having the  
20    coating film formed thereon, and developing the exposed  
substrate, said method comprising the steps of:

controlling a substrate treating condition relating to  
dissolving rate that influences a dissolving rate of said coat-  
ing film by development, according to a pivotal shift which is  
25    a difference between an actual pattern size and a mask

pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an exposing condition resulting in little variation in pattern size even with variations in focus of exposing light; and

5 performing said series of substrate treating processes based on said substrate treating condition relating to dissolving rate as controlled.

10 10. A substrate treating method as defined in claim 9, wherein said substrate treating condition relating to dissolving rate is a temperature in a developing atmosphere, said series of substrate treating processes being performed based on said temperature as controlled.

15 11. A substrate treating method as defined in claim 9, wherein said substrate treating condition relating to dissolving rate is a humidity in a developing atmosphere, said series of substrate treating processes being performed based on said humidity as controlled.

20 12. A substrate treating method as defined in claim 9, wherein said substrate treating condition relating to dissolving rate is a concentration of a developing solution, said series of substrate treating processes being performed based  
25 on said concentration as controlled.

13. A substrate treating method as defined in claim 9,  
wherein said substrate treating condition relating to dissolv-  
ing rate is a temperature of a developing solution, said  
series of substrate treating processes being performed based  
5 on said temperature as controlled.

14. A substrate treating method as defined in claim 9,  
wherein said substrate treating condition relating to dissolv-  
ing rate is a developing time, said series of substrate  
10 treating processes being performed based on said developing  
time as controlled.

15. A substrate treating method as defined in claim 9,  
wherein said substrate treating condition relating to dissolv-  
15 ing rate is controlled to reduce said pivotal shift to zero.

16. A substrate treating method for performing a series of  
substrate treating processes to form a pattern on a substrate  
by forming a coating film of a chemically amplified photore-  
20 sist on the substrate, exposing the substrate having the  
coating film formed thereon, and developing the exposed  
substrate, said method comprising the steps of:

controlling a substrate treating condition relating to  
acid diffusion that influences spread of an acid produced in  
25 said coating film by exposure of said coating film, according

to a pivotal shift which is a difference between an actual pattern size and a mask pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an exposing condition resulting in little variation in pattern size even with variations in focus of exposing light, and controlling a substrate treating condition relating to dissolving rate that influences a dissolving rate of said coating film by development, according to said pivotal shift; and

10 performing said series of substrate treating processes based on said substrate treating condition relating to acid diffusion and said substrate treating condition relating to dissolving rate as controlled.

15 17. A substrate treating method as defined in claim 16, wherein said substrate treating condition relating to acid diffusion is a substrate treating condition relating to pre-exposure heating that influences heating of the coating film before said exposure.

20 18. A substrate treating method as defined in claim 16, wherein said substrate treating condition relating to acid diffusion is a substrate treating condition relating to post-exposure heating that influences heating of the coating

25 film after said exposure.

19. A substrate treating method as defined in claim 17,  
wherein said substrate treating condition relating to  
pre-exposure heating is a heating time of the coating film  
before said exposure, said series of substrate treating proc-  
5 esses being performed based on said heating time as con-  
trolled.

20. A substrate treating method as defined in claim 17,  
wherein said substrate treating condition relating to  
10 pre-exposure heating is a heating temperature of the coating  
film before said exposure, said series of substrate treating  
processes being performed based on said heating tempera-  
ture as controlled.

15 21. A substrate treating method as defined in claim 18,  
wherein said substrate treating condition relating to  
post-exposure heating is a heating time of the coating film  
after said exposure, said series of substrate treating proc-  
esses being performed based on said heating time as con-  
20 trolled.

22. A substrate treating method as defined in claim 18,  
wherein said substrate treating condition relating to  
post-exposure heating is a heating temperature of the  
25 coating film after said exposure, said series of substrate

treating processes being performed based on said heating temperature as controlled.

23. A substrate treating method as defined in claim 16,  
5 wherein said substrate treating condition relating to dissolving rate is a temperature in a developing atmosphere, said series of substrate treating processes being performed based on said temperature as controlled.

10 24. A substrate treating method as defined in claim 16, wherein said substrate treating condition relating to dissolving rate is a humidity in a developing atmosphere, said series of substrate treating processes being performed based on said humidity as controlled.

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25. A substrate treating method as defined in claim 16, wherein said substrate treating condition relating to dissolving rate is a concentration of a developing solution, said series of substrate treating processes being performed based  
20 on said concentration as controlled.

26. A substrate treating method as defined in claim 16, wherein said substrate treating condition relating to dissolving rate is a temperature of a developing solution, said  
25 series of substrate treating processes being performed based



on said temperature as controlled.

27. A substrate treating method as defined in claim 16,  
wherein said substrate treating condition relating to dissolv-  
5 ing rate is a developing time, said series of substrate  
treating processes being performed based on said developing  
time as controlled.

28. A substrate treating method as defined in claim 16,  
10 wherein said substrate treating condition relating to acid  
diffusion is controlled to reduce said pivotal shift to zero.

29. A substrate treating method as defined in claim 16,  
wherein said substrate treating condition relating to dissolv-  
15 ing rate is controlled to reduce said pivotal shift to zero.

30. A substrate treating apparatus for performing a series  
of substrate treating processes to form a pattern on a sub-  
strate by forming a coating film on the substrate, exposing  
20 the substrate having the coating film formed thereon, and  
developing the exposed substrate, said apparatus  
comprising:

switching means for selecting whether to set a sub-  
strate treating condition according to a pivotal shift which is  
25 a difference between an actual pattern size and a mask

pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an exposing condition resulting in little variation in pattern size even with variations in focus of exposing light;

5            wherein said series of substrate treating processes is performed based on said substrate treating condition selected or a substrate treating condition deselected by said switching means.

10    31.    A substrate treating apparatus for performing a series of substrate treating processes to form a pattern on a substrate by forming a coating film on the substrate, exposing the substrate having the coating film formed thereon, and developing the exposed substrate, said apparatus  
15    comprising:

             substrate treating condition selecting means for selecting one substrate treating condition from a plurality of substrate treating conditions of the same type; and

             correlation storage means for storing correlations  
20    between a plurality of substrate treating conditions, a pivotal shift which is a difference between an actual pattern size and a mask pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an exposing condition resulting in little variation in  
25    pattern size even with variations in focus of exposing light, a

substrate treating conditions relating to acid diffusion that influences spread of an acid produced in said coating film by exposure of said coating film, and a substrate treating condition relating to dissolving rate that influences a  
5 dissolving rate of said coating film by development;  
wherein said series of substrate treating processes is performed based on said substrate treating condition selected by said substrate treating condition selecting means and said correlations read from said correlation storage  
10 means.

32. A substrate treating apparatus as defined in claim 31, wherein said type relates to a coating solution for forming said coating film on the substrate.

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33. A substrate treating apparatus as defined in claim 31, wherein said type relates to pattern size.

34. A substrate treating apparatus as defined in claim 31,  
20 wherein said type relates to pattern form.

35. A substrate treating apparatus as defined in claim 31, wherein, after performing said series of substrate treating processes based on said correlation read from said  
25 correlation storage means, results of the processes are

stored in said correlation storage means, to reflect said results of the processes on a next series of substrate treating processes.

- 5 36. A substrate treating apparatus for performing a series of substrate treating processes to form a pattern on a substrate by forming a coating film on the substrate, exposing the substrate having the coating film formed thereon, and developing the exposed substrate, said apparatus
- 10 comprising:
- type selecting means for selecting at least one type from different types of substrate treating conditions;
  - substrate treating condition selecting means for selecting one substrate treating condition from a plurality of
  - 15 substrate treating conditions of the same type selected by said type selecting means; and
  - correlation storage means for storing correlations between a plurality of substrate treating conditions, a pivotal shift which is a difference between an actual pattern
  - 20 size and a mask pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an exposing condition resulting in little variation in pattern size even with variations in focus of exposing light, a substrate treating condition relating to acid diffusion that
  - 25 influences spread of an acid produced in said coating film by

exposure of said coating film, and a substrate treating condition relating to dissolving rate that influences a dissolving rate of said coating film by development;

wherein said series of substrate treating processes is  
5 performed based on said substrate treating condition selected by said substrate treating condition selecting means and said correlations read from said correlation storage means.

10 37. A substrate treating apparatus as defined in claim 36, wherein said type relates to a coating solution for forming said coating film on the substrate.

38. A substrate treating apparatus as defined in claim 36,  
15 wherein said type relates to pattern size.

39. A substrate treating apparatus as defined in claim 36, wherein said type relates to pattern form.

20 40. A substrate treating apparatus as defined in claim 36, wherein, after performing said series of substrate treating processes based on said correlation read from said correlation storage means, results of the processes are stored in said correlation storage means, to reflect said  
25 results of the processes on a next series of substrate treating

processes.

41. A substrate treating apparatus for performing a series of substrate treating processes to form a pattern on a substrate by forming a coating film on the substrate, exposing  
5 the substrate having the coating film formed thereon, and developing the exposed substrate, said apparatus comprising:

switching means for selecting whether to set a substrate treating condition according to a pivotal shift which is  
10 a difference between an actual pattern size and a mask pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an exposing condition resulting in little variation in pattern  
15 size even with variations in focus of exposing light;

substrate treating condition selecting means for selecting one substrate treating condition from a plurality of substrate treating conditions of the same type; and

correlation storage means for storing correlations  
20 between a plurality of substrate treating conditions, said pivotal shift, a substrate treating condition relating to acid diffusion that influences spread of an acid produced in said coating film by exposure of said coating film, and a substrate treating condition relating to dissolving rate that influences  
25 a dissolving rate of said coating film by development;

wherein said series of substrate treating processes is performed based on said substrate treating condition selected or a substrate treating condition deselected by said switching means; and

5            wherein, when the substrate treating conditions are switched by said switching means, said series of substrate treating processes is performed based on said substrate treating condition selected by said substrate treating condition selecting means and said correlations read from said  
10 correlation storage means.

42. A substrate treating apparatus as defined in claim 41, wherein said type relates to a coating solution for forming said coating film on the substrate.

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43. A substrate treating apparatus as defined in claim 41, wherein said type relates to pattern size.

44. A substrate treating apparatus as defined in claim 41,  
20 wherein said type relates to pattern form.

45. A substrate treating apparatus as defined in claim 41, wherein, after performing said series of substrate treating processes based on said correlation read from said  
25 correlation storage means, results of the processes are

stored in said correlation storage means, to reflect said results of the processes on a next series of substrate treating processes.

5    46.    A substrate treating apparatus for performing a series of substrate treating processes to form a pattern on a substrate by forming a coating film on the substrate, exposing the substrate having the coating film formed thereon, and developing the exposed substrate, said apparatus

10   comprising:

                 switching means for selecting whether to set a substrate treating condition according to a pivotal shift which is a difference between an actual pattern size and a mask pattern size, said actual pattern size being obtained from a processing carried out at a pivotal point which is an

15   exposing condition resulting in little variation in pattern size even with variations in focus of exposing light;

                 type selecting means for selecting at least one type from different types of substrate treating conditions;

20                   substrate treating condition selecting means for selecting one substrate treating condition from a plurality of substrate treating conditions of the same type selected by said type selecting means; and

                 correlation storage means for storing correlations

25   between a plurality of substrate treating conditions, said



pivotal shift, a substrate treating condition relating to acid diffusion that influences spread of an acid produced in said coating film by exposure of said coating film, and a substrate treating condition relating to dissolving rate that influences  
5 a dissolving rate of said coating film by development;

wherein said series of substrate treating processes is performed based on said substrate treating condition selected or a substrate treating condition deselected by said switching means; and

10 wherein, when the substrate treating conditions are switched by said switching means, said series of substrate treating processes is performed based on said substrate treating condition selected by said substrate treating condition selecting means and said correlations read from said  
15 correlation storage means.

47. A substrate treating apparatus as defined in claim 46, wherein said type relates to a coating solution for forming said coating film on the substrate.

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48. A substrate treating apparatus as defined in claim 46, wherein said type relates to pattern size.

49. A substrate treating apparatus as defined in claim 46,  
25 wherein said type relates to pattern form.

50. A substrate treating apparatus as defined in claim 46,  
wherein, after performing said series of substrate treating  
processes based on said correlations read from said correla-  
5 tion storage means, results of the processes are stored in  
said correlation storage means, to reflect said results of the  
processes on a next series of substrate treating processes.